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Patentanmeldung Nr.   Patent application No.   Demande de brevet n°

98112501.6

Der Präsident des Europäischen Patentamts;
Im Auftrag

For the President of the European Patent Office

Le Président de l'Office européen des brevets
p.o.

R C van Dijk

Anmeldung Nr: Anmeldetag:
Application no.:   98112501.6   Date of filing: 06.07.98
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Anmelder/Applicant(s)/Demandeur(s):

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Bezeichnung der Erfindung/Title of the invention/Titre de l'invention:
(Falls die Bezeichnung der Erfindung nicht angegeben ist, siehe Beschreibung.
If no title is shown please refer to the description.
Si aucun titre n'est indiqué se referer à la description.)

Method to perform a scheduled action of network devices

In Anspruch genommene Priorität(en) / Priority(ies) claimed /Priorité(s)
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As requested, the entries pertaining to the applicant of the above-men-
tioned European patent application/to the proprietor of the above-men-
tioned European patent have been amended to the following:
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The registration of the changes has taken effect on ...**-5. 04. 00**..........

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Method to Perform a Scheduled Action of Network Devices

Description

1   This invention concerns a method to perform a scheduled action of devices
    that are connected via a network.

    Usually in consumer electronics home networks, e.g. an IEEE 1394 based
5   home network, a clock device triggers all other devices. All devices receive this
    trigger command at the same time and should start at the same time.

    Scheduled action in the contents of the present invention always means that
    predetermined actions of predetermined devices should be performed
10 synchronous at a predetermined time.

    Normally a network, like a home network, comprises different devices and due
    to their individual constructions every device needs a different start-up time.
    E.g. a VCR mechanic has to move the tape into position or a tuner has to move
15 the dish to the desired satellite and to tune to the transponder. Therefore, in
    the conventional home network every device will start its action at a different
    time and therefore the invoking application will not be started synchronously
    at all devices and also not exactly at the predetermined time.

20 Therefore, it is the object of the present invention to offer a method to perform
    a scheduled action of devices that are connected via a network with a synchro-
    nous start according to the invoking application.

    The inventive method to perform a scheduled action of the devices that are
25 connected via a network is characterized in that an individual triggering time
    is calculated for every device that should perform a predetermined action at a
    predetermined time.

    Due the calculation of not one triggering time for all devices participating in
30 the scheduled action like in the prior art, but of an individual triggering time
    for every device all different start-up times of the individual devices are taken
    into account and it is possible to start a predetermined action of a predeter-
    mined device really at a predetermined time and not at said predetermined
    time plus the start-up time of the respective device.

1   Advantageous embodiments of the present invention as defined in independent
     claim 1 are respectively defined in dependent claims 2 to 11.

     One exemplatory advantageous embodiment of the present invention will be
5   described in detail below with reference to Fig.1 which illustrates one specific
     embodiment of the present invention and shows the messages between differ-
     ent network devices that are exchanged according to the invention to perform a
     scheduled action of several devices so that the invoking application is started
     simultaneously at all participating devices.
10
     An invoking application 1 programs the resource manager 2 that is present in
     the network with a scheduled action in a first step S1. Such an invoking appli-
     cation 1 can e.g. be based on an user command to record a predetermined pro-
     gram that can be received by a tuner present in the network with a VCR also
15   present in said network. The invoking application 1 programs the tuning of the
     tuner to said predetermined program at a predetermined time and the starting
     of the VCR-recording at said predetermined time into the resource manager 2
     as well as the switching-off of the tuner and the VCR simultaneously after the
     program has been recorded.
20
     In the following steps, here steps S2 and S3 the resource manager 2 transfers
     the respective start/stop command list and said predetermined time to the
     various devices that are needed for the respective programmed scheduled ac-
     tion. In the shown example the start time 10:15:00 is transferred together with
25   the individual start/stop command list to device A 3 that has a start-up time
     of 10 seconds in step S2 and together with the individual start/stop command
     list to device B 4 that has a start-up time of 15 seconds in step S3. device A 3
     can e.g. be a VCR whose mechanic needs 10 seconds to move the loaded tape
     into the correct position and the device B 4 could be a tuner that needs 15
30   seconds to move its dish to the desired satellite and to tune its transponder.

     The individual start-up time is dependent on the respective device. According
     to the present invention, it is also possible that one device has different start-
     up times for different actions to be performed. After a respective device
35   receives the start/stop command list that describes the predetermined action
     to be performed the device can look up the start-up time needed for this action
     in a look-up table that can be based on the worst case start-up times of the

 1   respective device or it can determine the start-up time on the basis of the
     current state of the respective device, e.g. how far a tuner has to move its
     satellite dish depending on the current position. It is also possible that the
     start-up time is generated on a combination of the worst case start-up time
 5   and the current state of the respective device. The setting of a too high start-
     up time is not desirable, since several scheduled actions with only small time
     differences at one device might then more easily conflict.

     When a device has received a start/stop command list and a predetermined
10   time at which the command described in the start/stop command list should
     be executed or cancelled and has generated its individual start-up time for this
     respective command it calculates an individual triggering time at which it
     should be triggered to have enough time to prepare itself and start exactly at
     the time the scheduled action should start. Therefore, the individual start-up
15   time is subtracted from the predetermined time of the scheduled action which
     is then transmitted to a clock device 5 of the network which serves as a trig-
     ger. In the shown example, the device A 3 transmits its individual triggering
     time 10:14:50 in step S4 to the clock device 5 and the device B 4 transmits its
     individual triggering time 10:14:45 in step S5 to the clock device 5.
20
     In the following the clock device 5 triggers the device B 4 in a step S6 at the
     time it has been programmed to trigger said device B 4 and in a step S7 at a
     time it has been programmed to trigger said device A 3. Therefore, every device
     A 3 and B 4 is triggered at an individual time so that it has enough time to
25   prepare itself and start exactly at the time the respective scheduled action
     should start.

     Of course, it is also possible that the individual triggering times are not calcu-
     lated by every device A 3 or B 4 itself, but by the clock device 5 or by another
30   device provided therefore in the network. Therefore, the clock device 5 or the
     other device has to know the individual start-up time of the respective devices
     or of the respective commands that should be executed in the respective de-
     vices and the predetermined time that is set for the scheduled action. The
     functionality of the other device can also be included in the recource manager
35   2.

     It is also possible that every device has an internal clock to trigger its device at

1   its individual triggering time. In this case every internal clock device has to be
     somehow synchronized with the clock device 5 of the network.

     As can be seen from the above exemplatory embodiment of the present inven-
5   tion, the resource manager 2 does not directly instruct the clock device 5 by
     himself. Every device A 3, B 4 knows its own start-up time, e.g. the worst case
     start-up time, and instructs the clock device 5 for the individual triggering
     command that is calculated according to the predetermined time at which the
     scheduled action should take place and the individual start-up time of the re-
10   spective device or the respective command of the respective device. The general
     triggering command according to the prior art is individually preset with the
     start-up time of a respective device so that the device has enough time to pre-
     pare itself and start exactly at the time the scheduled action should take place
     after reception of the triggering command. Such an individually preset trigger-
15   ing command is generated for every involved device.

     The present invention is preferably executed in a home network in which it is
     desired by the user that various actions should take place at exactly the same
     time, e.g. the tuner of the home network has to receive a desired program at
20   exactly the time the user whishes to record said program with a VCR and vice
     versa the VCR has to start its recording at exactly the same time the program
     begins. Preferably, such a home network is a 1394 based home network.

25

30

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Claims

1   1.   Method to perform a scheduled action of devices (3, 4) that are connected
via a network, **characterized in that** an individual triggering time is calculated
for every device (3, 4) that should perform a predetermined action at a predeter-
mined time.

5

2.   Method according to claim 1, **characterized in that** said individual trig-
gering time is calculated based on the synchronous start time of said scheduled
action and an individual start-up time that the respective device (3, 4) needs to
perform said predetermined action.

10

3.   Method according to claim 1 or 2, **characterized in that** the individual
start-up time a respective device (3, 4) needs to perform said predetermined ac-
tion is determined on the basis of the worst case start-up time the respective
device (3, 4) needs to perform said predetermined action.

15

4.   Method according to anyone of claims 1 to 3, **characterized in that** the
individual start-up time a respective device (3, 4) needs to perform said prede-
termined action is determined on the basis of the current state of the respective
device (3, 4).

20

5.   Method according to anyone of claims 1 to 4, **characterized in that** a re-
source manager (2) of the network respectively transmits said predetermined ac-
tion and said predetermined time of said scheduled action to each device (3, 4)
that should perform said predetermined action at said predetermined time.

25

6.   Method according to anyone of claims 1 to 5, **characterized in that** every
device (3, 4) calculates its individual triggering time itself.

7.   Method according to claim 6, **characterized in that** every device (3, 4)
30   sets an internal clock with the calculated individual start-up time that triggers
said device (3, 4) at its individual triggering time.

8.   Method according to claim 6, **characterized in that** every device (3, 4)
transmits said triggering time to a clock device (5) of the network.

1   9.   Method according to anyone of claims 1 to 4, **characterized in that** a re-
source manager (2) of the network respectively transmits said predetermined ac-
tion and said predetermined time of said scheduled action for every device (3, 4)
that should perform said predetermined action at said predetermined time to a
5   clock device (5) of the network or an other device in the network and respec-
tively said predetermined action to the respective device (3, 4), and every device
(3, 4) that should perform said predetermined action at said predetermined time
transmits its individual start-up time needed to perform the predetermined ac-
tion to said clock device (5) or to that other device.

10

10.   Method according to claim 9, **characterized in that** said clock device (5)
or that other device calculates the individual triggering time for every device (3,
4).

15   11.   Method according to claim 10, **characterized in that** said other device
transmits its calculated triggering times for every device (3, 4) to said clock de-
vice (5).

12.   Method according to anyone of claims 9 to 11, **characterized in that** said
20   other device can also be the recource manager (2).

13.   Method according to anyone of claims   8 to 12, **characterized in that**
said clock device (5) triggers said device (3, 4) at its individual triggering time.

25   14.   Method according to anyone of claims 1 to 13, **characterized in that** said
network is a home network.

15.   Method according to anyone of claims 1 to 14, **characterized in that** said
network is a 1394 based network.

30

16.   Method according to anyone of claims 1 to 15, **characterized in that** said
device (3, 4) is a consumer electronic device.

35

Abstract

Method to Perform a Scheduled Action of Network Devices

The present invention offers a method to perform a scheduled action of devices
(3, 4) that are connected via a network by calculating an individual triggering
time for every device (3, 4) that should perform a predetermined action at a
predetermined time. This individual triggering time is calculated based on the
synchronous start time of said respective scheduled action and an individual
start-up time of the respective device (3, 4) participating in said scheduled ac-
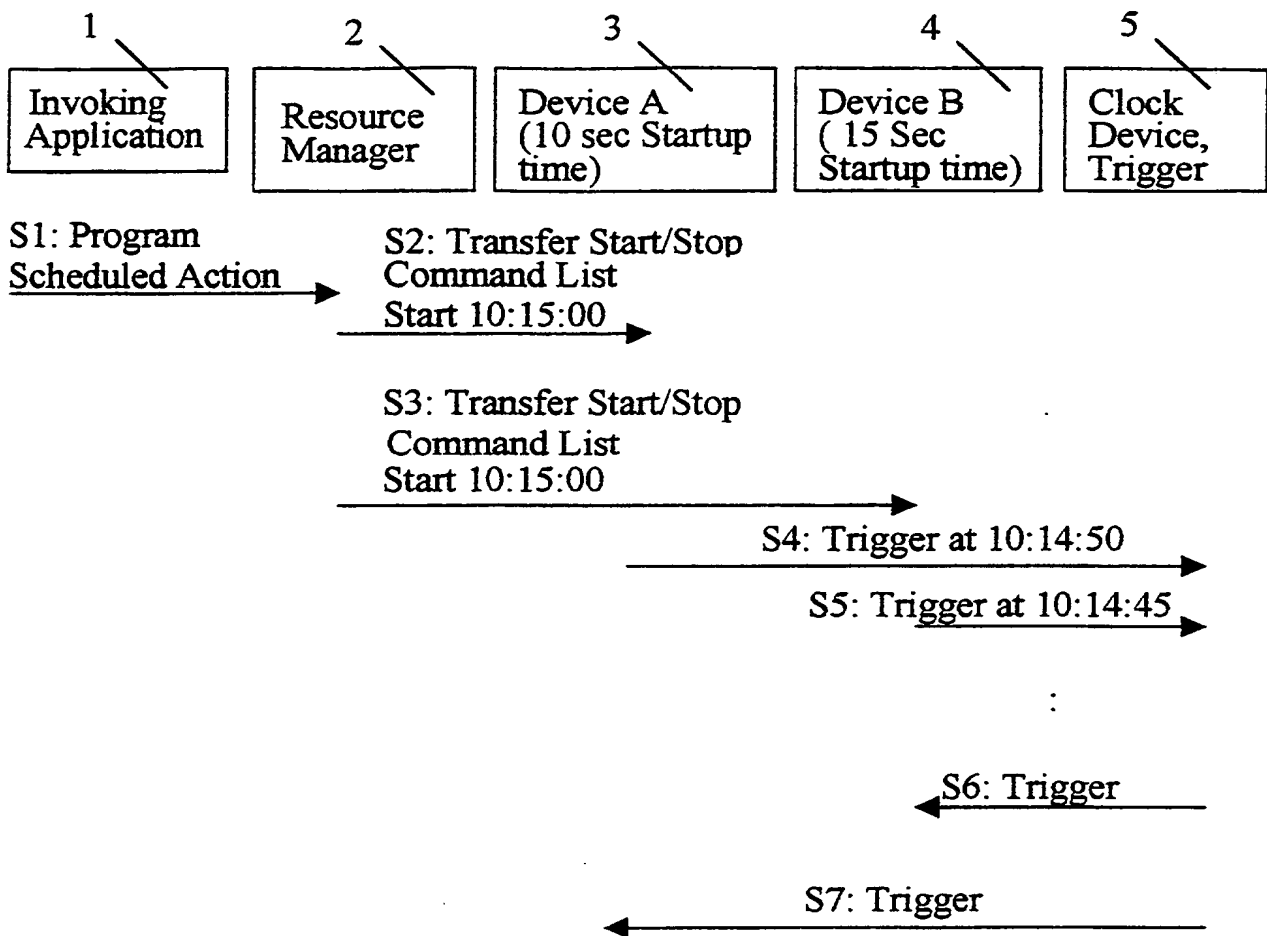tion.

(Fig. 1)

1	2	3	4	5
Invoking Application	Resource Manager	Device A (10 sec Startup time)	Device B (15 Sec Startup time)	Clock Device, Trigger

S1: Program
Scheduled Action →

S2: Transfer Start/Stop
Command List
Start 10:15:00 →

S3: Transfer Start/Stop
Command List
Start 10:15:00

S4: Trigger at 10:14:50

S5: Trigger at 10:14:45

:

S6: Trigger

S7: Trigger

Fig. 1